

Faculty of Engineering and Technology
Radha Govind University
Chandausi, Sambhal (U.P.)



Evaluation Scheme & Syllabus for
Department of Computer Science & Engg.
DIPLOMA –COMPUTER SCIENCE & ENGINEERING
III Year (5th & 6th Semester)
(Effective from session _____)

DIPLOMA - ELECTRICAL ENGG. STUDY AND EVALUATION SCHEME

3rd Year, 5th Semester

SUBJECT CODE	SUBJECT SNAME	STUDY SCHEME			Credits	MARKS/EVALUATION SCHEME						Total Marks of Internal & External
		Periods /Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DCS 501	Object Oriented Programming	1	-	4	3	30	-	30	70	-	70	100
DCS 502	Fundamentals of Internet of Things	1	-	4	3	30	-	30	70	-	70	100
DCS 503	Program Elective-II a) Mobile App Development b) Multimedia Technologies	2	-	2	3	30	-	30	70	-	70	100
DCS 504	Program Elective-III a) Information Security b) Advance Computer Networks	1	-	4	3	30	-	30	70	-	70	100
DCS 505	Open Elective –II a) Product Design b) Engineering Economics & Accountancy c) AI & ML	2	-	-	2	30	-	30	70	-	70	100
DCS 506	Object Oriented Programming Lab	-	-	4	2	-	25	25	-	25	25	50
DCS 507	Fundamentals of Internet of Things Lab	-	-	4	2	-	25	25	-	25	25	50
DCS 508	Program Elective-III Lab	-	-	4	2	-	25	25	-	25	25	50
DCS 509	Summer Internship	-	-	-	2	-	-	-	-	50	50	50
Total					22	150	100	250	350	100	450	700

For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.

Note: -1. Students will present a seminar/viva on their summer internship along with certificate, project and report.

2. Students will submit the certificate.

DIPLOMA -ELECTRICAL ENGG. STUDY AND EVALUATION SCHEME

3rd Year, 6th Semester

SUBJEC CODE	SUBJECT SNAME	STUDY SCHEM E Periods /Wee k			Credits	MARKSINEVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMEN T			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DCS 601	Program Elective -4 a) AI b) Data Sciences & Machine Learning	4	-	-	4	30	-	30	70	-	70	100
DCS 602	Entrepreneurship And Start- Up*	2	-	-	2	30	-	30	70	-	70	100
DCS 603	Open Elective-III a) Disaster Management b) Renewable Energy Technology	2	-	-	2	30	-	30	70	-	70	100
DCS 604	Project Work	4	-	16	12	-	240	240	-	160	160	400
Total					20	90	240	330	210	160	370	700

For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.

Note: *Common Course with other diploma programmes . "Entrepreneurship and Start-up"
course is also mandatory in Industrial internship/training mode.

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DCS 501

Object Oriented Programming Using Java

COURSE OBJECTIVES

This course offers the modern programming language JAVA that will help the students to implement the various concept of object orientation practically. The students will be able to program in the object oriented technology with the usage of JAVA.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO 1: Install Java IDE, Compiler, Java virtual machines and understand basic concepts of Java

CO 2: Implement basic Java programs

CO 3: Explain and implement the concept of Object-oriented Programming

CO 4: Explain and implement Abstract class, Interface and Polymorphism using Java program.

CO 5: Understand Exceptions and develop multithreaded programs

COURSE CONTENTS

UNIT 1: Introduction and Features

(2 Periods)

Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP), Object oriented programming concepts – Classes, object, object reference, abstraction, encapsulation, inheritance, polymorphism, Introduction of eclipse (IDE) for developing programs in Java

UNIT 2: Language Constructs

(3 Periods)

variables, data types : Integer, floating point type, character, Boolean operators, iteration and jump statement, conditional expressions, input using scanner class and output statement, loops, switch case, arrays, introduction to methods.

UNIT 3: Classes and Objects:

(3 Periods)

Class fundamentals, constructors, declaring objects (Object & Object Reference), creating and accessing variables and methods, static and non static variables/methods defining packages, Creating and accessing a package, Importing packages, Understanding CLASSPATH, auto boxing , String , String Buffer. Inheritance :Definition of inheritance, protected data, private data, public data, constructor chaining, order of invocation, types of inheritance, single inheritance,

multilevel inheritance, hierarchical inheritance, hybrid inheritance , access control (Private Vs Public Vs Protected Vs Default).

UNIT 4: Abstract Class, Interface and Polymorphism

(3 Periods)

Defining an interface, Key points of Abstract class & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface. Method and constructor overloading, method overriding, up-casting and down-casting.

UNIT 5: Exception Handling and Multithreading

(3 Periods)

Definition of exception handling, implementation of keywords like try, catches, finally, throw & throws, built-in exceptions, difference between multi threading and multi tasking, thread life cycle, creating threads, thread priorities.

RECOMMENDED BOOKS

1. Programming with Java: A Primer;
2. E. Balagurusamy Head First Java,
3. O-REILLY, Kathy Sierra & Bert Bates.
4. OCA Java SE Programmer I Certification Guide ,
5. Wiley Publisher ,
6. Mala Gupta PROGRAMMER'S GUIDE TO JAVA SE 8 , Pearson , Khalid E Mughal.

Object Oriented Programming Using Java LAB

LIST OF PRACTICALS

1. WAP to create a simple class to find out the area and perimeter of rectangle and box using super and this keyword.
2. WAP to design a class account using the inheritance and static that show all function of bank (withdrawal, deposit).
3. WAP to design a class using abstract methods and classes.
4. WAP to design a string class that perform string method (equal, reverse the string, change case).
5. Consider we have a Class of Cars under which Santro Xing, Alto and Wagon R represents individual Objects.

In this context each Car Object will have its own, Model, Year of Manufacture, Color, Top Speed, etc. which form Properties of the Car class and the associated actions i.e., object functions like Create(), Sold(), display() form the Methods of Car Class.

6. In a software company Software Engineers, Sr. Software Engineers, Module Lead, Technical Lead, Project Lead, Project Manager, Program Manager, Directors all are the employees of the company but their work, perks, roles, responsibilities differs. Create the Employee base class would provide the common behaviors of all types of employee and also some behaviors properties that all employee must have for that company.

7. Using the concept of multiple inheritance create classes: Shape, Circle, Square, Cube, Sphere, Cylinder. Your

classes may only have the class variable specified in the table below and the methods Area and/or Volume to output their area and/or volume.

8. WAP to handle the exception using try and multiple catch block.
9. WAP that implement the Nested try statements.
10. WAP to create a package that access the member of external class as well as same package.
11. WAP that show the partial implementation of interface.
12. WAP to create a thread that implement the Runnable interface.

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DCS 502

FUNDAMENTAL OF INTERNET OF THINGS

Course Objectives

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain like agriculture, space, healthcare, manufacturing, construction, water, and mining. IoTbased applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology. This introductory syllabus will enable learners to leverage their business and/or technical knowledge across IoT-related functions in the workplace.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to

CO1: Basic understanding of IoT.

CO2: Familiarizing with different sensors.

CO3: Understanding Arduino programming.

CO4: Implementing IoT through Raspberry Pi.

CO5: Design IoT models using sensors and actuators.

COURSE CONTENTS

1. Introduction to Internet Of Things (IoT)

(10 Periods)

(Introduction to IoT, Defining IoT, Things in IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT,IoTProtocols,IoT communication Models, IoT communicationAPI's,IoT enabling Technologies.

2. IoT Devices

(12 Periods)

How electronic devices fit with the Internet of Things, and why they are important : Breadboard and its internal connections , ,LED and its connections ,Tri-color LED ,Resistor Introduction to the many 'end devices', sensors and actuators, differentiate between different sensor types

3. IoT Networks

(12 Periods)

Introduction to the components of basic IoT networks, the types of network connections and how data travels through them, and the role of Internet Protocols. understanding of microcontrollers/Arduino and communication protocols

4.Ardunino (12 Period)

Feature of arduino device ,Ardunino device introduction Components of Arduino board)C Arduino Programming Language ,Understanding of basic of Arduino IDE, function ,control statement ,loops ,datatype,variables

5. IoT and M2M (10 Periods)

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking , network function virtualization, IoT and WoT.

Reference Books:

1. Buyya, Rajkumar & Dastjerdi, Amir Vahid, Internet of Things: Principles and Paradigms, Morgan Kaufmann, 2016.
2. Hanes, David et al., IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press, 2017.
3. Dian, John F., Fundamentals of Internet of Things: For Students and Professionals, Wiley, 2022.

FUNDAMENTAL OF INTERNET OF THINGS LAB

LIST OF PRACTICALS

Practical using Arduino-Interfacing Sensors :

1. Installation of Arduino IDE
2. Interfacing Light Emitting Diode (LED)- Blinking LED
3. Interfacing Button and LED – LED blinking when button is pressed.
4. Interfacing Light Dependent Resistor (LDR) and LED, displaying automatic night lamp
5. Interfacing Temperature Sensor (LM35) and/or humidity sensor (e.g. DHT11)
6. Interfacing Liquid Crystal Display (LCD) – display data generated by sensor on LCD
7. Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD, switch on LED when data sensed is higher than specified value.
8. Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
9. Interfacing Relay module to demonstrate Bluetooth based home automation application. (using Bluetooth and relay).

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DCS 503

PROGRAM ELECTIVE-II

(Mobile App Development)

COURSE OBJECTIVES:

To facilitate students to understand android SDK and help students to gain a basic understanding of Android application development to inculcate working knowledge of Android Studio development tool.

COURSE OUTCOMES:

After completion of this course, the student will be able to:

CO1 Explain the Android platform, SDK, application architecture, and Manifest file to understand the structure of Android applications.

CO2 Design Android applications using Activities, Services, Intents, Broadcast Receivers, permissions, and intent filters for effective application flow and communication.

CO3 Create interactive Android user interfaces using layouts, UI components, and animations to enhance user experience.

CO4 Apply testing, publishing, preference handling, and resource management techniques for reliable and scalable Android applications.

CO5 Develop data-driven and network-enabled Android applications using SQLite, Content Providers, networking, web, and telephony APIs.

COURSE CONTENT

UNIT - I

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT - II

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT - III

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT - IV

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT - V

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Reference Books:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition.

DCS 503
PROGRAM ELECTIVE-II
(Multimedia Technologies)

COURSE OBJECTIVES

To introduce students to the domain of Multimedia Technologies, which explain the technologies underlying digital images, videos and audio contents, including various compression techniques and standards, and the issues to deliver multimedia content over the Internet.

COURSE OUTCOMES

Student will understand various aspects of Multimedia and related standards.
Student will be able to build multimedia content and applications and also multimedia enable Web applications and mobile applications.

COURSE CONTENT

UNIT 1: Introduction to Multimedia (10 Periods)

Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software, Multimedia operating systems, Multimedia communication system

UNIT 2: Basic Compression Techniques (12 Periods)

Video and Audio Data Compression Techniques – Lossy and Lossless.

Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265

UNIT 3: Content Development and Distribution (10 Periods)

Desktop publishing (Coral Draw, Photoshop, Page maker) Multimedia Animation & Special effects (2D/3D animation, Flash)

UNIT 4: Introduction to Digital Imaging (10 Periods)

Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia

Reference Books:

1. An Introduction to Multimedia Authoring, A. Eliens
2. Fundamentals of Multimedia, Prentice Hall/Pearson, Ze-Nian Li & Mark S. Drew.
3. Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018
4. Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

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DCS 504

PROGRAM ELECTIVE-III

(Information Security)

COURSE OBJECTIVES

To learn how to evaluate and enhance information security of IT infrastructure and organizations

COURSE OUTCOMES

Understanding of security needs and issues of IT infrastructure. Have basic skills on security audit of networks, operating systems and application software.

CO1: Understand the fundamentals of information security, its various aspects, and security features of operating systems including authentication, access control, auditing, and malware protection.

CO2: Analyze security weaknesses in networking protocols and devices, and apply appropriate security solutions such as VPNs, VLANs, IPSec, and HTTPS to mitigate risks.

CO3: Explain the basics of cryptography and Public Key Infrastructure (PKI), and apply secure coding practices while developing software applications.

CO4: Identify and evaluate network security products such as firewalls, IDS/IPS, VPN concentrators, and content screening gateways for securing enterprise networks.

CO5: Understand security standards, legal frameworks, and compliance requirements including ISO 27001, Indian IT Act, IPR laws, and perform basic security audit procedures.

COURSE CONTENT

UNIT 1:

(8 Periods)

Introduction to Information Security, Various aspects of information security (PAIN), Security Features of Operating Systems – Authentication, Logs, Audit Features, File System Protection, User Privileges, RAID options, Anti-Virus Software, etc.

UNIT 2: (10 Periods)

Understanding security weaknesses in popular networking protocols – IP, TCP, UDP, RIP, OSPF, HTTP,SMTP, etc.; security weaknesses in common networking devices – Hub, switch, router, WiFi; Security solutions to mitigate security risk of networking protocols (IPSec, HTTPS, etc) and devices (VLAN, VPN, Ingress Filtering, etc)

UNIT 3: (8 Periods)

Basics of Cryptography, PKI, Security considerations while developing software's

UNIT 4: (8 Periods)

Network Security Products – Firewall, IDS/IPS, VPN Concentrator, Content Screening Gateways, etc.

UNIT 5: (8 Periods)

Introduction to Security Standards – ISO 27001, Indian IT Act, IPR Laws; Security Audit procedures; Developing Security Policies; Disaster Recovery, Business Continuity Planning

REFERENCE BOOKS

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. RFCs of protocols listed in content (<https://www.ietf.org>)
3. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
4. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)
5. <https://www.cert-in.org.in/>
6. <https://www.sans.org/>

PROGRAM ELECTIVE-III

(Information Security) LAB

LIST OF PRACTICALS

1. Knowledge the security provided with windows operating system.
2. Recovery the password of window machines using password recover utility (John the ripper) or any other utility.
3. Tracing of email origin using email trace pro utility.
4. Use of Key logger and anti-key logger to secure yours system.
5. Encrypt and decrypt the message using simple transposition - Permutation (Cryptool)
6. Encrypt and decrypt the message using Caesar Cipher With variable key (Cryptool) Encrypt and decrypt the message using 3 X 3 Hill Cipher (Cryptool)
7. Create Digital Signature document using (Cryptool)
8. Send and receive secret message using steganography techniques using steghide.

DCS 504

PROGRAM ELECTIVE-III

(Advance Computer Networks)

COURSE OBJECTIVES

An understanding of the overriding principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.

CO1: Explain advanced networking fundamentals including IPv4 subnetting, multicasting, TCP flow and congestion control, and IPv6 addressing mechanisms.

CO2: Analyze telecom network architectures and switching techniques such as Frame Relay, ATM, MPLS, and VSAT communication systems.

CO3: Compare and evaluate wireless and cellular communication technologies including WiFi, WiMax, GSM, CDMA, 3G, and 4G networks. Apply Quality of Service (QoS) concepts, network redundancy, load balancing, caching, and network monitoring techniques using SNMP and RMON.

CO4: Describe and implement basic network security mechanisms including VLANs, VPNs, firewalls, IPS, and proxy servers.

CO5: Design and simulate computer networks using appropriate IP addressing schemes and protocol analyzers such as Wireshark.

COURSE CONTENT

UNIT 1: Review of Networking Basics (10 Periods)

Advance Topics in IPv4 – Subnetting, Multicasting, Multicast Routing Protocols (IGMP, PIM, DVMRP); Advance Topics in TCP – flow management, congestion avoidance, protocol spoofing; IPv6

UNIT 2: Telecom Networks, Switching Techniques (10 Periods)

Introduction to Frame Relay, ATM, MPLS; VSAT Communication – Star and Mesh architectures, bandwidth reservation; Wireless Networks – WiFi, WiMax, Cellular Phone Technologies – GSM, CDMA, 3G, 4G

UNIT 3: QoS (6 Periods)

Network Redundancy, Load Balancers, Caching, Storage Networks; QoS; Network Monitoring – SNMP, RMON

UNIT 4: Introduction to Network Security (8 Periods)

VLAN, VPN, Firewall, IPS, Proxy Servers

UNIT 5: Network Simulation**(8 Periods)**

Network Simulation, Network design case studies and exercises, IP Addressing schema, Protocol Analysers (Wireshark, etc)

Reference Books:

1. RFCs and Standards Documents (www.ietf.org and other standard body websites)
2. Communication Networking – An Analytical Approach, Anurag-Manjunath-Joy
3. TCP/IP Illustrated (Vol.1,2), Stevens
4. Data Networks, Bertsekas-Gallager
5. An Engineering Approach to Computer Networking, S. Keshav

PROGRAM ELECTIVE-III

(Advance Computer Networks) LAB

LIST OF PRACTICALS

1. Study different types of network cables and implement cross wired cables and straight through cables using clamping tools.
2. From given data find subnet, broadcast, range, subnet bits.
3. Study of various basic network commands and network configuration commands.
4. Performing an initial router configuration.
5. Interpreting Ping and trace-route output.
6. Connecting the computers in Local Area Network.
7. Perform logical Troubleshooting.
8. Observing Static and Dynamic Routing.
9. Configuring the Router as a DHCP Server.
10. Perform various networking operations using Packet Tracer.

DCS 505
OPEN ELECTIVE-II
(Product Design)

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COURSE OBJECTIVES

The objective of product design is to create a product with excellent functional utility and sales appeal at an acceptable cost within a reasonable time.

COURSE OUTCOMES

At the end of the course, the student will be able to

CO1: Understand the characteristics and concepts used for product design

CO2: Assess the customer requirements in product design.

CO3: Apply structural approach for product design.

CO4: Develop optimized methods to minimize the cost.

CO5: Design simple products.

COURSE CONTENT

UNIT-I: Definition of a product; (5 Periods)

Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

Unit-II: Product life cycle; (6 Periods)

The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies.

Unit-III: Product design; (6 Periods)

Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

Unit-IV: Introduction to optimization in design; (6 Periods)

Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

Unit-V: Design of simple products: (5 Periods)

Dealing with various aspects of product development; Design starting from need till the manufacture of the product, Open Elective Courses 448.

Reference Books:

1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford : New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, “Product Design and Manufacturing”, Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

DCS 505
OPEN ELECTIVE-II
(ENGINEERING ECONOMICS & ACCOUNTANCY)

COURSE OBJECTIVES

Students will analyze the performance and functioning of government, markets and institutions in the context of social and economic problems. Students will think critically about economic models, evaluating their assumptions and implications.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO 1: Understand the concept of Managerial Economics

CO 2: Understand and Analyze Demand and Supply

CO 3: Analyze and Estimate Production Cost

CO 4: Apply Pricing methods in practice

CO 5: Understand concepts of Accounting

COURSE CONTENT

UNIT-I: Introduction: (5 Periods)

Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

Unit-II: Demand & Supply Analysis: (6 Periods)

Demand; Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting; Supply; Determinants of supply; Supply function; Supply elasticity.

Unit-III: Production and Cost Analysis: (6 Periods)

Production function; Returns to scale; Production optimization; Least cost input; Isoquants; Managerial uses of production function; Cost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

Unit-IV: Pricing:**(6 Periods)**

Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control

Unit-V: Elementary Accounting :**(5 Periods)**

Introduction to Accountancy, Cash flow analysis; Payback Period; Net Present Value.

Reference Books:

1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics' Thomson South Western, 10th Edition, 2005.
3. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.
4. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
5. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
6. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.

DCS 505
OPEN ELECTIVE-II
(AI & ML)

COURSE OBJECTIVE

This course is designed to equip students with essential theoretical and practical skills need for understanding the requirements, collection of data, pre-processing of data, building and deploying machine learning and artificial intelligence solutions to real world applications. Participants will gain hands-on experience with the latest software, enabling them to adopt latest technologies in line with industry requirements and building competency in the Machine Learning and Artificial Intelligence field.

COURSE OUTCOME

- Understand the fundamentals of Machine Learning and AI and their practical applications.
- Understanding of Basic Mathematical Concepts used in AI and ML.
- Understand Data Collection and Data Pre-Processing.
- Understand Basics of AI and Machine Learning
- Develop python programming skills for Machine Learning and AI.
- Understand the role of Supervised, Unsupervised and Deep Learning in real world applications.
- Select appropriate Machine Learning Algorithm for specific applications.
- Implementation of Regression Analysis for Prediction.
- Train a logistic regression model for binary classification.

COURSE CONTENTS

1 Industrial Safety Practices

- Fire Extinguishers & its Types
- Safely handling Tools & Equipment

- Use of proper Tools & Equipment & its maintenance
- OSH & practices to be observed as a precaution

2 Fundamentals required for AI and ML

- Introduction to Artificial Intelligence and Machine Learning
- Need of AI and ML
- Basic Mathematical concepts related to AI and ML
- Data Collection, Data Processing and Cleaning
- Types of Data Sources
 - o Structured Data
 - o Unstructured Data
 - o Semi Structured
 - o Realtime Data
 - o Open Data Set
 - o Data Scraping
- Data Acquisition Techniques
 - o APIs (Application Programming Interfaces): Collection of from External Sources)
 - o Web Scrapping
 - o Surveys and Forms
 - o Sensor Data
 - o Database and Data Warehouse
- Data Integration
 - o Combining Data from Multiple Sources
 - o Data Merging (Combing Data from different Tables)
 - o Data Aggregation

- Data Pre-Processing

- o Data Cleaning

- o Outlier Detection and Removal

- o Duplicate Data

3. Programming concepts for AI and ML

- o Python Basics

- o Python Structure

- o NumPy

- o Pandas

- o Matplotlib and Seaborn

- o Scikit-learn

4 Introduction to Supervised Machine Learning

Types of Machine Learning Techniques (Supervised, Unsupervised and Reinforcement Learning)

- Supervised Learning

- o Regression

- o Classification

- o Logistic Regression

- o Support Vector Machines

- o Decision Tree

- o Random Forest

- o K – Nearest Neighbors (KNN)

- o Use cases of Regression and Classification

Introduction to Unsupervised Learning

- Clustering

- o K – Means Clustering
- o Hierarchical Clustering
- o DBSCAN
- Dimensionality Reduction
- Anomaly Detection
- Use cases of clustering and Dimensional Reduction
- Building Machine Learning Model
- Model Evaluation and Validation
- Machine Learning Model Deployment

5 Deep Learning, Reinforcement Learning and Natural Language Processing

- o Fundamentals of Deep Learning
- o Convolutional Neural Networks (CNNs)
- o Recurrent Neural Networks (RNNs)
- o Natural Language Processing
- o Reinforcement Learning
- o TensorFlow and Kera

Generative AI

- o Understanding of Gen AI
- o Applications of Gen AI
- o Development of Gen AI model
- o Integration of Gen AI in Mobile App.
- o Deployment

6 Deep Learning Applications

- o Computer Vision
- o Natural Language Processing

- o Speech Recognition

- o Model Deployment

7 Ethics and Responsibility in AI and Machine Learning

- o Ethics in AI and ML

- o Accountability and Responsibility

- o Privacy and Data Protection

- o Social Impact of AI

- o Ethical Guidelines

INSTRUCTIONAL STRATEGY

The teacher should lay stress on the fundamentals of artificial intelligence and Machine Learning. The students must know about scope and future aspects of artificial intelligence and Machine Learning.

DCS 509

SUMMER INTERNSHIP (4-6 WEEK) (INDUSTRIAL TRAINING)

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It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of 4 weeks duration to be organized during the semester break starting after second year i.e. after 4th semester examinations.

The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An external assessment of 50 marks has been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details. The teacher along with field supervisors will conduct performance assessment of students. The

components of evaluation will include the following:

Punctuality and regularity 15%

Initiative in learning new things 15%

Presentation and VIVA 15%

Industrial training report 55%

6TH SEMESTER

L	T	P
4	0	0

DCS 601

PROGRAM ELECTIVE-IV

Artificial Intelligence (AI)

COURSE OBJECTIVES

The main learning objectives of the course are to: Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques. Participate in the design of systems that act intelligently and learn from experience.

COURSE OUTCOME

After successful completion of this course, the students should be able to

CO1: Understanding the basic concepts of Artificial Intelligence.

CO2: Describing different AI searching algorithms.

CO3: Applying various optimization techniques to real world problems.

CO4: Capable of implementing autonomous planning under constraints in simulated or real environment.

CO5: Applying different AI logics to solve various problems.

COURSE CONTENTS

UNIT 1: Introduction (8 Periods)

Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of SymbolicAI, Agents.

UNIT 2: Searching (8 Periods)

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

UNIT 3: (10 Periods)

Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search, Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net. Game Playing: Mini max Algorithm, AlphaBeta Algorithm, SSS*.

UNIT 4: (8 Periods)

Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graphplan, Constraint Propagation.

UNIT 5:**(8 Periods)**

Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining.

REFERENCE BOOKS

1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India)
2. <https://nptel.ac.in/courses/106106126/>
3. Stefan Edelkamp and Stefan Schroedl. Heuristic Search, Morgan Kaufmann.
4. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence, A K Peters/CRC Press
5. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.
6. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall
7. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House.

DCS 601

PROGRAM ELECTIVE-IV

Data Sciences & Machine Learning

COURSE OBJECTIVES

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO 1: Understand the basics of Data Science

CO 2: Visualize and Analyze Data

CO 3: Understand concept of Exploratory Data Analysis

CO 4: Understand and develop Machine Learning Algorithms.

CO 5: Implement Mining Process on Social Network Graph

COURSE CONTENTS

UNIT 1: Introduction of data Science and Machine Learning: (10 Periods)

Fundamentals of Artificial Intelligence, need and applications of Data Science, Data Mining, data preparation, Machine Learning , Types and Applications of Machine learning

UNIT 2: Data Preprocessing, Analysis and Visualization: (6 Periods)

Data Pre-processing: Pre-processing Techniques- Mean Removal, Scaling, Normalization, Binarization, One Hot Encoding, Label encoding, Data Analyses: Loading and summarizing the dataset, Data Visualization: Univariate Plots, Multivariate Plots, Training Data, Test Data, Performance Measures

UNIT 3: Statistical Inference & Exploratory Data Analysis and the Data Science Process (10 Periods)

Populations and samples, Types of Statistical modelling, Types of probability distributions. Parametric and Non Parametric Methods, Distance Metrics. Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

UNIT 4: Machine Learning Algorithms**(8 Periods)**

Introduction to Supervised Learning Algorithms –Decision Tree, Linear Regression, k Nearest Neighbours (kNN), SVM and Introduction to Unsupervised Learning Algorithms - K-means Clustering, Mean Shift Algorithm, Dimensionality Reduction Techniques, Introduction to Neural Networks.

UNIT 5: Mining Social-Network Graphs, Data Science and Ethical Issues (8 Periods)

Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighbourhood properties in graphs, Discussions on privacy, security, ethics, A look back at Data Science, Next-generation data scientists.

Reference Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

DCS 602

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Entrepreneurship And Start-UP

COURSE OBJECTIVES:

To foster an entrepreneurial mind set by equipping students with the skills to identify business opportunities, formulate comprehensive business plans, understand management functions, and navigate the financial and legal landscapes of starting and sustaining a venture.

COURSE OUTCOMES(CO):

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Explain the concept of entrepreneurship, classify business structures, and distinguish between the roles of an entrepreneur and manager.

CO2: Identify feasible business ideas using activity maps and develop a preliminary Business Plan based on case study analysis.

CO3: Analyze market strategies using STP and SWOT analysis, and formulate the Vision, Mission, and Objectives for a start-up.

CO4: Discuss the fundamental functions of management, organizational structures, and the processes of recruitment, selection, and training.

CO5: Select appropriate financing methods (Govt schemes, Venture Capital) and apply Intellectual Property Rights (IPR) concepts to protect business ideas.

CO6: Describe the strategies for business succession, harvesting, and the legal types of dissolution.

COURSE CONTENTS

Unit – I: Introduction to Entrepreneurship and Start – Ups (05 Periods)

Definitions, Classification of Entrepreneur Traits of an Entrepreneur, Entrepreneurship, Motivation Types of Business Structures- On the Basis of size and on the basis of ownership Similarities/differences between entrepreneurs and managers

Unit – II: Business Ideas and their implementation (04 Periods)

Discovering ideas and visualizing the business

Activity map

Business Plan (Case Study)

Unit – III: Ideas to Start-up**(08 Periods)**

Marketing and Accounting- Definition and Importance. Market Analysis – STP (Segmentation, Targeting, Positioning) Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives. Risk analysis- SWOT Analysis.

Unit – IV: Management**(06 Periods)**

Definition Concept and Functions of Management Company's Organization Structure- Concept and Classification Recruitment and Selection- Definition, Training and Development- Importance.

Unit – V: Financing and Protection of Ideas**(03 Periods)**

Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing). Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses Communication of Ideas to potential investors – Investor Pitch.

Unit – VI: Succession, Dissolution and Harvesting strategy (02 Periods)

Ways of succession

Types of Dissolution

INSTRUCTIONAL STRATEGY

Entrepreneurship and start-ups includes: use experiential learning, integrate real-world projects, provide mentorship, foster interdisciplinary collaboration, partner with businesses, invite industry professionals for lectures, organize business plan competitions, offer practical consulting opportunities, and help students launch real ventures to build entrepreneurial skills and mindsets.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Model/Proto type making.

RECOMMENDED BOOKS:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company – Steve Blank and Bob Dorf, K & S Ranch, ISBN: 978-0984999392
2. Entrepreneurship Development (A New Venture Creation) – Vasant Desai, Himalaya Publishing House
3. Entrepreneurship Development – S.S. Khanka, S. Chand & Company Ltd., New Delhi

4. Entrepreneurship Development – Gupta and Srinivasan, S. Chand & Company Ltd., New Delhi

5. Demand: Creating What People Love Before They Know They Want It – Adrian J. Slywotzky with Karl Weber, Headline Book Publishing, ISBN: 978-0755388974

6. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses – Eric Ries, Penguin UK, ISBN: 978-0670921607

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2	0	0

DCS 603

OPEN ELECTIVE-III

(Disaster Management)

COURSE OBJECTIVES

Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

COURSE OUTCOMES

CO 1: Understanding disaster and hazards

CO 2: Understanding types, consequences and control of disasters

CO 3: Understanding Disaster Management Cycle

CO 4: Understanding Disaster Management Acts in India

CO 5: Understanding application of technology for Managing the disasters

COURSE CONTENTS

Unit – I: Understanding Disaster

(6 Periods)

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

(10 Periods)

Geological Disasters (earthquakes, landslides, tsunamis, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework

(10 Periods)

Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early

Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

(10 Periods)

Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies

Unit- V: Applications of Science and Technology for Disaster Management

(6 Periods)

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.

References

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

DCS 603
OPEN ELECTIVE-III
(Renewable Energy Technology)

COURSE OBJECTIVES

- To understand present and future scenario of world energy use.
- To understand fundamentals of solar energy systems.
- To understand basics of wind energy
- To understand bio energy and its usage in different ways.
- To identify different available non-conventional energy sources

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Understand present and future energy scenario of the world.
- Understand various methods of solar energy harvesting.
- Identify various wind energy systems.
- Evaluate appropriate methods for Bio energy generations from various Bio wastes.
- Identify suitable energy sources for a location.

DETAILED COURSE CONTENT

UNIT-I: INTRODUCTION

(05 periods)

World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials; Achievements/ Applications; Economics of renewable energy systems.

UNIT-II: SOLAR ENERGY

(06 periods)

Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation

Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

UNIT-III: WIND ENERGY

(05 periods)

Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

UNIT-IV: BIO-ENERGY

(06 periods)

Biomass direct combustion; Biomass gasifies; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

UNIT-V: OTHER RENEWABLE ENERGY SOURCES

(06 periods)

Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

REFERENCE BOOKS:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.

DCS604

PROJECT WORK

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4	0	16

RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The students should identify themselves or accept the given project assignment at least two to three months in advance.

The project work identified in collaboration with industry should be preferred. Each teacher is expected to guide the project work of 5–6 students. The project assignments may consist of:

Programming customer based applications Web page designing (Only dynamic) Database applications Software Development

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:

- Use effectively oral, written and visual communication
- Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Identify, analyze and solve problems creatively through sustainment critical investigation.
- Develop, leadership abilities..
- Apply fundamental and disciplinary concepts and methods in ways appropriate to their areas of study.

A suggestive criterion for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

The overall grading of the practical training shall be made as per following table

Range of maximum marks Overall grade

- i) More than 80 Excellent
- ii) 79 < > 65 Very good
- iii) 64 < > 50 Good
- iv) 49 < > 40 Fair
- v) Less than 40 Poor.

In order to qualify for the diploma, students must get “Overall Good grade” failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated before being disqualified and declared “not eligible to receive diploma ”. It is also important to note that the students must get more than six “goods” or above “good” grade in different performance criteria items in order to get “Overall Good” grade. Important Notes

1. These criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.
3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.
4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criterion of assessment, depending upon the type of project work. The students must submit a project report of not less than 50 pages (excluding coding). The report must follow the steps of Software Engineering Concepts

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.